



**STRATEGY
RESEARCH
PROJECT**

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**WHY THE U.S. ARMY NEEDS CORPS LEVEL
UNMANNED AERIAL VEHICLE COMPANIES**

BY

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USAWC STRATEGY RESEARCH PROJECT

Why the U.S. Army Needs Corps Level Unmanned Aerial Vehicle Companies

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ABSTRACT

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The first and only corps unmanned aerial vehicle (UAV) program, "Hunter", was terminated in January 1996, leaving all but one corps commander without the ability to shape the battle space. After completing the advanced concept technology demonstration, the Army released its high altitude endurance Predator UAV to the U.S. Air Force. Today, the Army's focus is on the brigade commanders' Tactical UAV - a system ill suited for corps imagery intelligence requirements. At issue is the gap in coverage and attendant loss of precision targeting capability created by the termination of the Hunter program. The Tactical UAV supports requirements out to 50 kilometers while Predator supports theater requirements down to 300 kilometers. The Army needs a Hunter or similar system to fill the gap between 50 and 300 kilometers, providing corps with the ability to shape the battle space in accordance with Army doctrine. This study identifies required capabilities and unique characteristics of corps requirements, and illuminates the tremendous risk incurred by not having parallel growth in UAV capability congruent with the transformed force. During Operation Allied Force, Task Force Hunter displayed to the Joint Force and V Corps Commanders the necessity for a corps level UAV.

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WHY THE U.S. ARMY NEEDS CORPS LEVEL UNMANNED AERIAL VEHICLE COMPANIES

The unmanned aerial vehicle holds out the greatest promise over the next twenty to thirty years. It is relatively inexpensive so its loss is not a disaster, it is small and unobtrusive, it can shift position, and in due course it will be able to carry multiple sensors and even weapons.¹

—The Future of War

The first and only corps unmanned aerial vehicle (UAV) program, "Hunter," was terminated in January 1996, leaving all but one corps commander without the ability to shape the battle space. At issue is the gap in intelligence collection and attendant loss of precision targeting capability created by the termination of the Hunter program. The Army incurs great risk by not pursuing a corps level UAV capability.

The purpose of this research project is to examine why corps commanders must have organic UAV companies, reaffirm requirements for UAV companies based on III and V corps concept of operations, document required UAV specific capabilities, form conclusions and make recommendations. The focal points of this study are UAV personnel and equipment, special skills, information dissemination architecture, and logistics with respect to corps level 24-hour operations. Specific sensor payloads and engine design are beyond the scope of this paper.

The primary source of information is my personal involvement with Army UAV programs over the past ten years. My most recent experience with UAV operations came as Commander of the 15th Military Intelligence Battalion, where I was specifically involved in corps-level UAV concept of operation development from February 1998 to February 2000. Throughout my command, the UAV Company supported numerous Corps level exercises, brigade command teams rotating at the National Training Center (NTC), and Joint Task Force Six counter narcotics-operation. The battalion's UAV Company, operating the Hunter system since 1996, was tasked to develop Army UAV tactics, techniques, and procedures. Tactics, technique and procedure development included: split-base operations; long haul communications; imagery dissemination methods; techniques for reducing personnel and equipment required for initial operations, fostering rapid projection; and twenty-four operations. These efforts prepared us well for the call to deploy in support of allied operations against Serbia in April 1999.

BACKGROUND

After the Persian Gulf War, the United States Army intelligence corps began restructuring to meet the evolving security environment and reduced resources. A family of

unmanned aerial vehicles to provide real-time eyes on targets across the depth of the battle space was envisioned: UAV-Close Range, UAV-Short Range, and UAV-Medium Altitude Endurance. The UAV-Short Range (Hunter) would provide the capability to have multiple airframes in the air simultaneously across the corps area of operations and broadcast real-time video to remote terminals and ground control stations.² The Hunter UAV system that was cancelled 1996, mainly due to technical problems and cost growth, was originally built to address the Army's short-range requirements.³ All but two of the seven Hunter systems built prior to cancellation were placed in storage at the TRW facility in Sierra Vista, Arizona just outside Fort Huachuca, the home of the Army's Intelligence School and Center. Fort Huachuca and Fort Hood each received one Hunter system. Fort Huachuca was designated as the training base for future Army UAV use. The 504th Military Intelligence Brigade became the executive agent at Fort Hood. The 15th Military Intelligence Battalion (Aerial Exploitation) experimented with Hunter to explore its usefulness and to develop UAV tactics, techniques and procedures.

The Army did not pursue a replacement for Hunter and decided to release the Predator (UAV: Medium Endurance) system to the Air Force after the advanced concept technology demonstration (ACTD) carried out by the Army Intelligence and Security Command (INSCOM). The Army shifted its focus to development of the UAV-Close Range, now termed tactical unmanned aerial vehicle (TUAV). The TUAV is designed and built to solely support brigade commanders' intelligence requirements. At issue is the gap in coverage and attendant loss of precision targeting capability created by the termination of the Hunter program. The TUAV supports brigade requirements out to 50 kilometers while the Predator supports theater requirements down to 300 kilometers. These decisions left the Army without an organic UAV capable of satisfying corps requirements between 50 and 300 kilometers and nothing on the drawing board. By acknowledging the corps commander's requirement still existed, Army UAV operational concepts would necessitate the Air Force Predator UAV system to span the gap in coverage created by Hunter's cancellation. A Congressional Budget Office paper noted,

With Hunter terminated, the Army proposes to rely on Predator—an Air Force system—to handle UAV missions at the division and corps level. However, the Air Force plans to buy just 12 Predator systems (each with four air vehicles and one ground control station) and to deploy only five of them to a regional conflict. The Air Force has stated that although it is willing to use Predator to support division and corps commanders, there may be higher priorities set by the theater commander or the national command authority that could require most, if not all, of the Predator assets.⁴

Recent experience in Operation Allied Force shows the notion of relying on Predator alone to satisfy both theater and corps is flawed. There were simply too few Predators to support coverage of so many critical targets across both corps and theater-level reconnaissance, intelligence, surveillance and target acquisition (RISTA) requirements. The ratio of targets to available UAVs will not get better in the future and it will get far worse as Army units become more dependent on information superiority. To ensure corps commanders are capable of striking high-pay off targets and shaping the battle space, they must have imagery of enemy targets at the range of their weapons systems. Presently that range easily exceeds 200 kilometers with missiles and attack helicopters. The argument for UAV ownership at corps versus reliance on the Air Force is more than just target saturation; it can easily be extended to timeliness. The need for timely intelligence increases dramatically for the close combat brigade and lower forces. Corps commanders can ill afford the time to negotiate or compete with theater level intelligence assets. In the final analysis, Army corps must be equipped with highly capable UAV companies.

WHY CORPS NEED UAV COMPANIES

Unmanned aerial vehicles provide corps commanders with the means to conduct RISTA without putting crewmembers at unnecessary risk. Corps commanders must possess the ability to see deep and shoot deep with precision in order to shape the battle space. Unmanned aerial vehicle imagery is an essential component of the corps commander's ability to conduct the deep fight.

The Army Corps must have a readily available, deployable, high performance UAV Company capable of operating in a variety of environments to accomplish its wartime mission, now and in the future. Corps commanders will be unable to shape the battle space with organic fires and attack helicopters

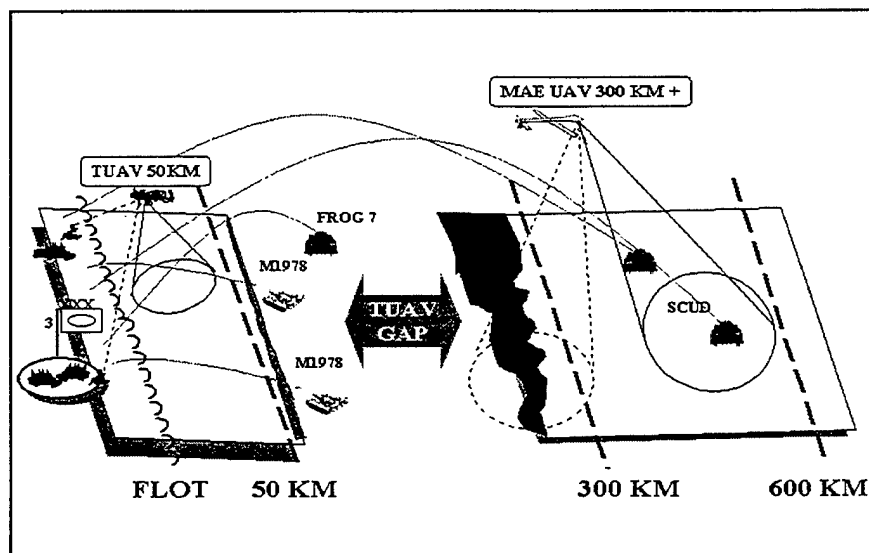


FIGURE 1. TUAV COLLECTION GAP

without a short-range UAV capability to close the gap between Predator and the brigade TUAV ranges. The gap exists between the TUAV's optimal range of 50 kilometers and Predator's optimal coverage beyond 300 kilometers⁵ (Figures 1 & 2). Threat weapon systems employed in the coverage gap could easily go undetected and destroy friendly forces.

The Hunter system can satisfy corps requirements by providing a high performance, operationally mobile UAV capable of flying high enough to overcome terrain obstacles and enhanced its survivability while maintaining line of sight with its ground station.

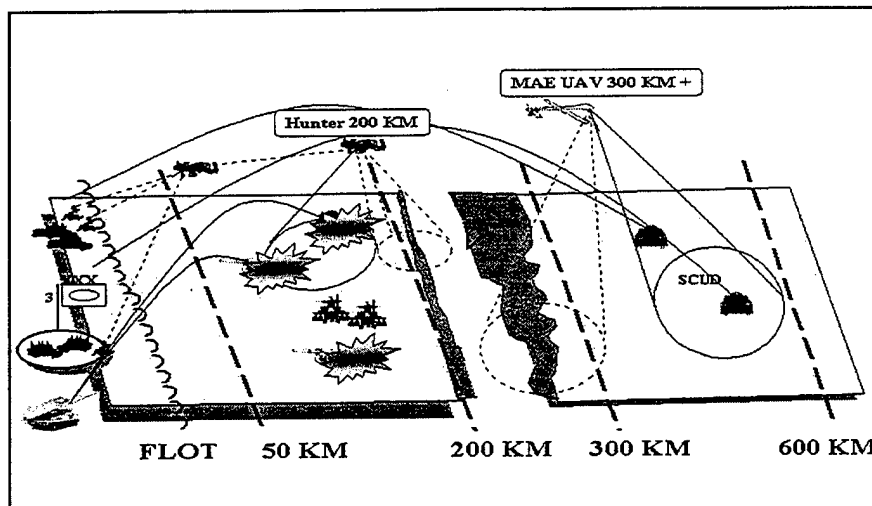


FIGURE 2. HUNTER COVERS THE GAP

Hunter's endurance and range at cruise speeds allow it to travel to the target areas and loiter for hours. The Hunter UAV uses a combination electro-optical (day television) and infrared (night television) module to produce full motion, real-time video imagery that is transmitted directly to the commander for viewing.⁶

III CORPS UAV CONCEPT OF OPERATION

UAV imagery is vital to III Corps Reconnaissance, Intelligence, Surveillance, and Target Acquisition functions. The III Corps Deep Operations Coordination Cell (DOCC) conducts precision targeting by combining rocket fires and attack aircraft with UAV imagery and other intelligence collectors.⁷ The III Corps commander relies heavily on UAVs to provide the "eyes" necessary to shape the battle space through deep and precise targeting.⁸ Success is inextricably linked to UAV imagery.

In Warfighter exercise (WFX) simulations, III Corps modeled the capability to cover two targets, to find and strike enemy high pay-off targets in engagement areas (EA), or fly one deep and the other in support of divisional units in close combat (Figure 3).

As authorized, in the modified table of organization and equipment (MTOE), III Corps' UAV Company was simply not robust enough to cover two targets simultaneously under 24-hour operations. In the event of war, the Intelligence Center and School would have to provide significant personnel and equipment augmentation. Even though Hunter had been cancelled, III Corps continued to develop the UAV concept through WFX and at the National Training Center. The corps UAV concept of operation was rehearsed during every WFX.

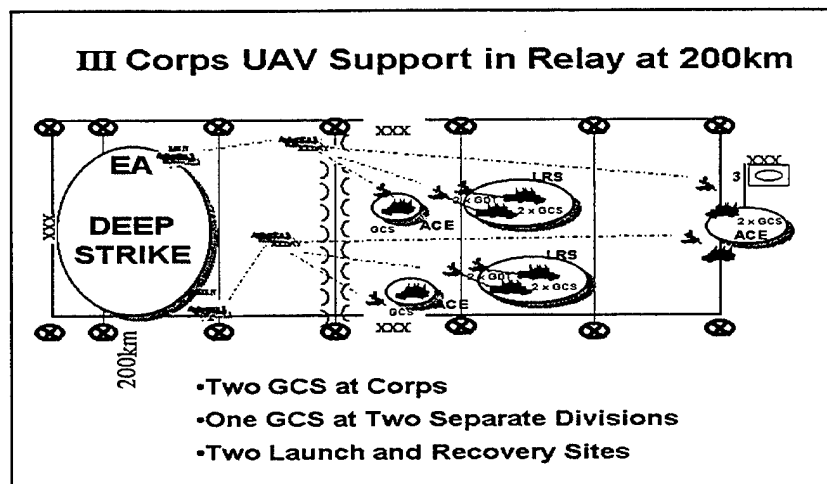


FIGURE 3. CORPS UAV CONCEPT

While III Corps' UAV Company was at the National Training Center (NTC) supporting 4th Infantry Division's 1st Brigade Combat Team, a warning order was sent for the possible deployment of UAVs to Macedonia in support of Operation Allied Force and V Corps. The company had priority for return transportation from Fort Irwin and once back at Fort Hood the deployment became a reality. With only days to recover its equipment and prepare for deployment, the company would have to scramble. The 504th MI Brigade commander task organized the UAV Company with a deployable intelligence support element, added military police, mechanics, weather, and other support personnel; and designated "Task Force Hunter."

Since V Corps did not possess a UAV, although such a capability had been played in their war games, the III Corps UAV Company deployed in support of V Corps during Operation Allied Force. Shortages of personnel and equipment that surfaced in III Corps exercises had to be overcome for V Corps' Kosovo operation to be effective.

The first sorties of C-17s departed Fort Hood for Germany on 28 March 1999. After a brief stop in Greece, the UAV Company arrived in Macedonia. On 4 April 1999, Task Force Hunter flew its first UAV combat mission in support of Operation Allied Force, the air operation over Kosovo. From 4 – 26 April 1999 it provided real-time imagery for Allied Force fighter and bomber targeting as well as instantaneous battle damage assessment. Hunter supported two

additional operational phases: V Corps' Task Force Hawk, 27 April-2 June 1999, and Task Force Falcon, 3 June-1 November 1999.⁹

V CORPS UAV CONCEPT OF OPERATION

Task Force Hawk was composed of Apache attack helicopters, an Army Tactical Missile System (ATACMS), and multiple rocket launch system (MRLS). Its mission: On order, TF Hawk attacks (Military and Paramilitary) armored vehicles, artillery, air defense artillery (ADA) systems, C2 nodes and troop concentrations to defeat enemy forces in and around Kosovo.¹⁰ Hunter provided support to the assigned Apache, rocket and missile units with target development, and reconnaissance of Apache routes and engagement areas, and mission rehearsals.

The task force (Hawk) enjoyed immense success tracking targets using UAVs, and sending this targeting data to the CAOC for attack. However, because of a shortage of collection assets available, the task force was not always able to dedicate assets to conduct battle damage assessment (BDA) to ensure the appropriate effects had been achieved. The TF usually had three Hunter UAVs to detect targets for the 24-hour, 48-hour and 72-hour fight. This did not allow the task force to track targets for attack, keep the UAV on target to provide BDA, and collect targeting information for current and future fights...Although Predator UAVs operated in theater, they were used for other missions and were not available to the TF.¹¹

Task Force Falcon was the implementation force. Hunter supported verification of the military technical agreement, route reconnaissance in support of British, and American Army and Marine Corps movements, force protection for initial entry forces, and Kosovo forces. Between 4 April and 1 November, Task Force Hunter flew 675 UAV sorties accounting for 3,864 flight hours providing real-time imagery intelligence for targeting, battle damage assessment, and force protection.

The successful performance of Task Force Hunter in Operation Allied Force provided a snapshot of future operations and reconfirmed the requirement for short-range UAVs for Army corps commanders.

ADDITIONAL PERSONNEL AND EQUIPMENT

Current UAV doctrine and, most importantly, UAV modified table of organization and equipment (MTOE) were out paced in III Corps exercises and remained outpaced when Task Force Hunter deployed to Kosovo. V Corps demanded the same capability simulated in III Corps WFXs, a capability beyond what doctrine and MTOE supported. III and V Corps

operations clearly illustrate the need for a corps UAV Company, and highlight the shortfall in current UAV MTOE authorizations for personnel and equipment. To accomplish the desired mission, Task Force Hunter received additional personnel and equipment prior to and following deployment. The composition of the Army Corps' UAV Company, as documented in the MTOE, is inadequate. III Corps' data derived from War plans and WFX exercises and, most recently, Task Force Hunter's support to V Corps' Task Force Hawk in Operation Allied Force supports this conclusion.

Requirements for 24-hour continuous coverage on two separate targets were outside the physical capabilities of the unmanned aerial vehicle company. Personnel and equipment augmentation, needed in simulation at III Corps, was deployed forward in support of Task Force Hawk. Figure 4 shows a comparison of a MTOE authorization, on-hand quantities prior to deployment and additional personnel and equipment that joined the Task Force following deployment.

Twenty-four hour continuous coverage on two targets required the augmentation of: sixteen military and three contractor UAV pilots (96U), one military and two contractor UAV mechanics (33W), and one additional contractor

Personnel	MTOE	ON HAND	Additional	TOTAL
96U	27	36	16	52
Contractors	0	1	3	4
33W	7	8	1	9
Contractors	0	1	2	3
52D	6	4	0	4
Contractors	0	1	1	2
Equipment	MTOE	ON HAND	Additional	TOTAL
UAV	8	8	4	12
GCS	4	4	2	6
GDT	2	4	2	6
MPU	5	7	2	9

power plant and propeller mechanic (MOS 52D). All additional contractor personnel were certified

FIGURE 4. ADDITIONAL PERSONNEL AND EQUIPMENT

instructors in their area of expertise and established sufficient depth to provide a rotational base for the contractor. Not listed in the MTOE were three TRW contract personnel assigned and six additional TRW contractors that were added to the pre-deployment manning. Additionally, the UAV Program Managers Office sent a representative to assist with logistical support.

V corps' concept of operations required additional equipment: four UAVs; as well as two ground control stations, ground data terminals, multifunction power units were added to the task force. As augmented, personnel and equipment proved adequate for sustained 24-hour operations, allowing for personnel sleep cycles, training and equipment maintenance.

To accommodate the 24-hour operational tempo, two 12-hour shifts were devised. Since imagery of two separate targets routinely required the use of four UAVs, with two in reserve, support personnel performed maintenance on the remaining six throughout the shift. Unmanned aerial vehicle specific personnel and equipment augmentation were necessary, but would not optimize the operation without additional specialized skill sets.

The parent battalion added aviation personnel, not contained on the UAV company authorization, in the disciplines of aviation standardization, safety and liaison officers. The integration of aviation standardization and safety infrastructure as well as aviation procedures into UAV operations made perfect sense. After all, for Task Force Hunter to be successful it would have to operate in a manned aircraft domain and in this case, a coalition effort. This integrated approach worked magnificently.

Integration of manned aviation infrastructure and procedures promoted the development of an equally important "army aviation culture." Unit decision-makers applied aviation risk management and fighter management techniques extensively. These techniques paid great dividends in maintaining 24-hour UAV operations while overcoming Serb anti-aircraft fire, challenging weather, and mountainous terrain. The result was sustained operational and safety excellence throughout the seven-month deployment. Battalion aviators, assigned as liaison officers, streamlined UAV integration into the host nation airspace, through the equivalent of the Federal Aviation Administration, and then into allied manned aircraft airspace over Kosovo.

HUNTER UAV CONCEPT OF OPERATION

Hunter's concept of operation required maintaining electronic line of sight. Line of sight (LOS) allows continuous communication between the UAV and its ground control station (GCS). Line of sight (LOS) establishes the data link through which flows UAV flight control inputs, camera commands and imagery to the GCS for dissemination to war fighters. Unmanned aerial vehicles may achieve LOS by the direct tether mode or relay mode. The direct tether mode requires maintaining clear air space between the UAV and the GCS. The relay mode creates LOS by passing electronic communication from one UAV to another. The Hunter UAV can be flown in either the direct tether mode or relay mode. The altitude of the UAV, distance to the target area, and terrain are key factors in choosing the mode of operation.

Given LOS between the UAV and its GCS is not obstructed by terrain, in the direct tether mode Hunter UAV can cover a range up to 125 kilometers (km) from the GCS in any direction. In the relay mode without terrain obstruction, UAV coverage potentially increases to a range of 200 km. If obstructing terrain is a factor or the target is beyond 125 km, the Hunter must use

the relay mode. With obstructing terrain, the relay mode will increase the coverage area by 75 kilometers beyond the obstruction.

In relay mode controllers pass commands through the relay UAV to the mission UAV. The relay UAV is flown down range to 125 km (the limit of the direct tether range LOS dependent) and placed into an orbit; this UAV is essentially an airborne antenna and placed on autopilot for the duration of the mission. The mission UAV can then be flown out beyond the relay UAV for up to 75 km.

In Kosovo, mountainous terrain reduced the direct tether LOS range to 50 km requiring Hunter operations throughout

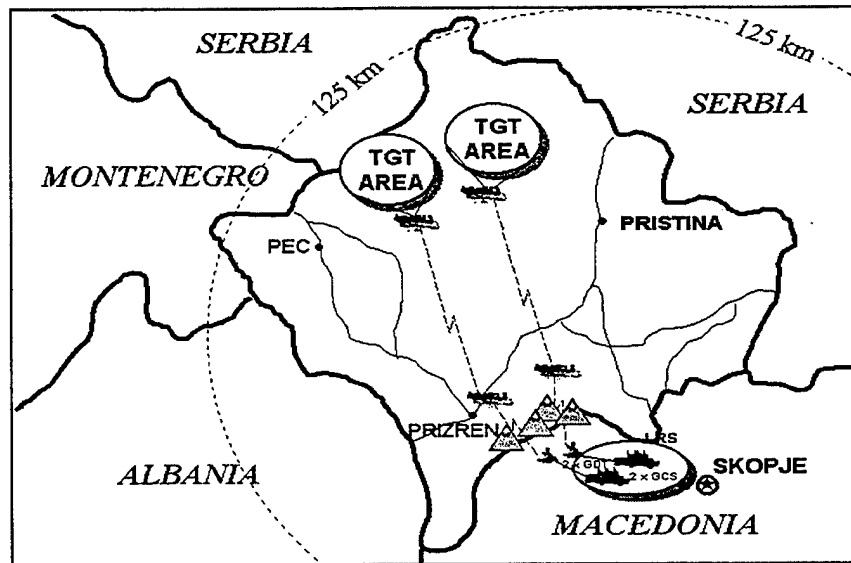


FIGURE 5. UAV RELAY CONCEPT

most of the area of operations (AOR) be flown in the relay mode. Figure 5, a map of the Kosovo province, illustrates the effect of the mountainous terrain on LOS. Without relay and its high service ceiling, Hunter's advertised 200-km range would have been reduced to 50 km – rendering it useless for Operation Allied Force. Although mountainous terrain in Kosovo reduced Hunter's reach to 125 km in the relay mode, it was sufficient to range targets throughout the Kosovo. However, relay mode alone was not enough to ensure success. Hunter's eight to ten hour endurance, 70 knot cruise speed, and service ceiling of 16,000 feet were also key factors in optimizing imagery support to reconnaissance, surveillance, and target acquisition. Altitude also kept Task Force Hunter's UAVs out of small arms range and enhanced survivability over a number of anti-aircraft weapon systems.¹² Optimizing support to the war fighter requires integrating UAV with manned aircraft through army aviation command and control, linking UAV imagery to a high-density dissemination architecture, equipping command and control with redundant secure communications, and providing timely logistics support.

ARMY AVIATION COMMAND AND CONTROL

Based upon the first-time real-world deployment of Hunter UAV, Task Force Hunter had to rely on Army aviation command and control procedures throughout the deployment. Battalion aviators, acting as liaison officers, worked closely with Air Traffic Control (ATC), host nation personnel at Skopje International Airport, Macedonia; joint military personnel in the Combined Air Operations Center (CAOC) in Vicenza, Italy; and at Task Force Hawk, Albania.

Air Traffic Control (ATC) personnel integrated Task Force Hunter UAV departures and arrivals with commercial and military transport operations in the traffic pattern and transient areas around the international airport. Air Traffic Control communication with UAV pilots replicated manned aircraft operations. Task Force Hunter liaison officers established Restricted Operation Zones as UAV climb corridors after clearing the immediate airport traffic.¹³

Restricted Operational Zones served two primary purposes: time to climb to mission altitude while maintaining line of sight between the ground control station and the UAV, and a descent orbit at end of the mission. At the CAOC, liaison officers quickly assimilated into the joint environment. The air tasking order included planned Task Force Hunter UAV collection operations. Liaison officers were absolutely vital to getting the UAVs into the fight. On the supported commander's staff, UAV liaison officers gained an understanding of operational objectives, intelligence requirements, and then worked airspace and coordinated with Airborne Warning and Control System (AWACS). It was up to Task Force Hunter personnel to win the confidence of ATC personnel and North Atlantic Treaty Organization (NATO) aircrews striking targets in Kosovo. Simply deconflicting UAV routes and altitudes were not good enough to achieve optimum results. Unmanned aerial vehicles had to be integrated, not deconflicted into the fight. The combination of our liaison officers and the exacting performance of the UAV pilots quickly won the confidence of the CAOC personnel, and Task Force Hawk and attacking aircrews. Task Force Hunter became a full partner in the skies over Kosovo within days of initial operation.

IMAGERY DISSEMINATION ARCHITECTURE

The Hunter system transmits imagery back to the ground station using the same data link used to control and fly the UAV. The GCS was usually co-located with the Tactical Operations Center (TOC) or G-2 enclave. A fiber-optic cable delivers imagery from the GCS to routers to television displays and/or monitors throughout the TOC. While this arrangement worked well in a National Training Center scenario, it did not work in Kosovo. With Task Force Hunter located in Macedonia and supported commanders in Italy, Albania and Kosovo, co-

location with either of their TOCs would have sub-optimized Kosovo coverage to the point of being useless.

In Kosovo, and many other regions of the world, only a superficial glance at terrain will confirm that with less capable UAV equipment, line of sight (LOS) is severely limiting. Since range is derived from LOS, "a look over the next hill" could merely provide a view of friendly troop positions not artillery and other threats within range of friendly troops. Hunter operations need to be as close as possible to the Kosovo province to ensure complete coverage. Electronic co-location via the Joint Broadcast System (JBS) was the solution, a capability not organic to the UAV Company. Joint Broadcast connectivity was provided by the theater.

Figure 6 diagrams the imagery collection and dissemination architecture created for Task Force Hunter. As a Hunter UAV

orbited the target, imagery was passed to the relay UAV to the ground data terminal (GDT) and ground control station (GCS). The GCS passed imagery via a JBS up-link to a satellite then down to Joint Analysis Center (JAC) Molesworth, England and then on a fiber optic-cable across the Atlantic to the Pentagon. Finally, the imagery entered the JBS satellite system and was transmitted to commander's downlinks in Italy (CAOC), Albania (TF Hawk), Kosovo (TF Falcon) and Macedonia (KFOR HQ). Imagery from target-to-user took only one and a half seconds, so the imagery being viewed by all users was real-time and full motion. As Hunter orbited, commanders and their staffs were able to see the target, decide whether to strike and with what ordnance, vector strike aircraft to the target, watch the ordinance impact and instantaneously conduct battle damage assessment. The JBS made Hunter imagery available to a host of users and secondary exploitation cells vital to continuous Intelligence preparation of the battle space. Hunter imagery of two simultaneous targets was passed via the JBS to

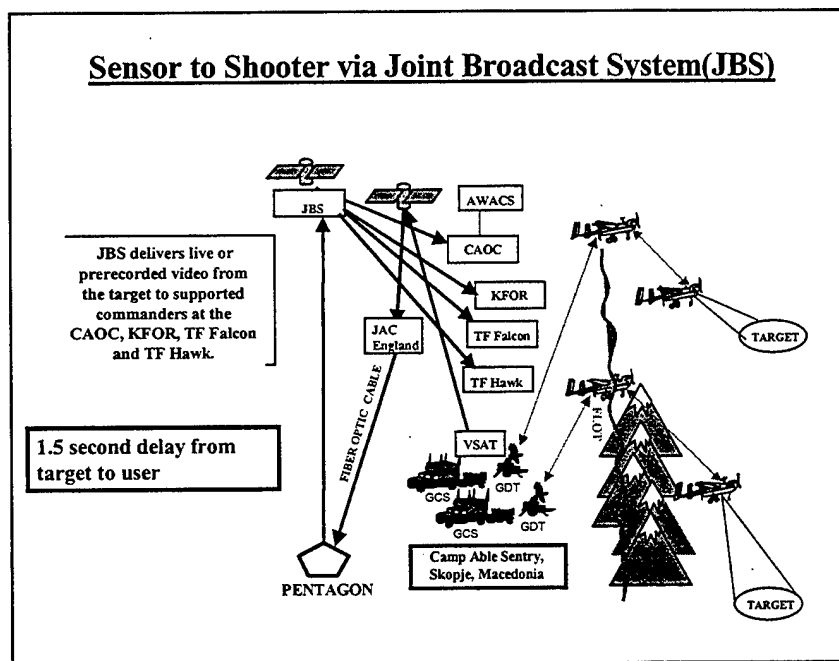


FIGURE 6. IMAGERY DISSEMINATION ARCHITECTURE

targeting cells in real time. A key feature of this concept of operation was the ability to dynamically re-task Hunter UAVs during flight to emerging targets. A comprehensive communication system made dynamic re-tasking possible.

COMMUNICATION ARCHITECTURE

The comprehensive communication architecture gave Task Force Hunter its operational flexibility and retasking capabilities allowing commanders to respond immediately to changing threats. Coordination between Hunter crews and the supported commander was continuous through secure communications. In addition to secure communications, the unit acquired very high frequency (AN/ARC 83) radios for UAV operators to maintain positive radio contact with air traffic control at all times.¹⁴ Air space clearance required coordination with civilian air traffic control communication when in Macedonian airspace and AWACS aircraft when supporting combat operations in Kosovo. Supported commanders at Task Forces Hawk and Falcon, the combined air operations center used four secure communications systems exclusively: secure telephone, secure mobile subscriber equipment (MSE), Ptarmigan (a British secure communication system, and secure Internet protocol network (SIPRNET). Although voice communications systems were handy for quick coordination, all parties relied on the SIPRNET as the primary means for passing mission requests, targets, and mission summaries.¹⁵ Hunter moved freely while supporting combat operations throughout Kosovo because of this communication architecture, and its on-board transponder, a beacon making its altitude and position verifiable by radar. However, logistics made Hunter's long-term relevance possible.

LOGISTICS

Long term performance hinged on timely resupply and effective maintenance. Resourcing Task Force Hunter with a pre-deployment 30-day supply of spare parts proved essential. On the ground, Task Force Hunter found they were dealing with a "one of a kind" system projected into a theater with an immature line of communication (LOC). For Task Force Hunter, it was truly a "come as you are" war. To make matters worse, within 60 days of arrival Task Force Hunter tripled its predeployment annual flying hour program; it flew into uncharted waters with regard to spare part demand and what would be needed next.

Resupply was a challenge for two reasons: (1) Serbian artillery and aircraft threats shutdown weekly military channel flights, leaving only surface trucking for resupply from Germany and (2) the nearest Hunter spare part was in TRW's depot facility at Sierra Vista, Arizona. Commercial air met the requirement briefly; however, this method had to be

abandoned due to Macedonian customs challenges. Ground transportation was the best available course of action.

The UAV Program Manager, added logistics personnel to both ends of the line of communication and established a depot forward in Germany to aid in timeliness of delivery. Once reestablished, the air channel LOC proved to be the most reliable method.

An unresponsive LOC, coupled with a low density/high demand system and an aggressive flying hour program greatly jeopardized Hunter's mission accomplishment. Although operational impact got close at times, the Hunter system proved very reliable. The ingenuity of Task Force Hunter personnel, and the UAV Program Office ensured spare parts were available. Responsive logistics proved crucial to sustaining the high demand/low-density UAV systems.

CONCLUSION

Perhaps prior to the war with Serbia, we could not see the urgency of completing what was started with the Hunter UAV system. In this analysis, the facts are crystal clear for our adversaries and us. A capable corps-level short-range UAV is essential to cover the gap between Shadow 200, the brigade level UAV, and the Predator.

The Army has three options: (1) do nothing and continue to accept the increasing risk, (2) ask the Air Force to provide corps-level UAV coverage requirements, or (3) acquire a short range UAV to replace the Hunter UAV and populate the four U.S. Army corps with UAV companies.

Doing nothing places the current and future force at great risk. Corps commanders must be able to shape the battle space for brigade combat teams. To be effective, corps artillery missiles, rockets and Apache helicopters must be able to strike with precision, while out of range of enemy fires. Unmanned aerial vehicle imagery provides the ability to conduct this precision engagement. Through information dominance, the transformed force will avoid the "first hit," rather than endure the "first hit" as in the case of the legacy force.¹⁶ If the Army transforms the force without a companion effort in UAV capability at corps, it will not be able to ensure the transformed force can avoid the "first hit." Furthermore, legacy doctrine held that evolving forces would provide for a modicum of redundancy and security as higher level units could add additional forces to the main effort, provide intelligence, and logistics to react to unforeseen threats. Essentially when echeloned, corps could assume their divisions' mission, divisions could assume brigade's mission, and so on. Evolving doctrine requires that brigade combat teams be projected several hundred, even thousands of kilometers deep, totally displaced from supporting echelons. Add the impact of modern asymmetric threats and the risk

to these displaced forces soars. Unmanned aerial vehicles organized and equipped at corps-level flown in support of displaced forces are key to mitigating risk created as a result of the loss of echeloning. Without UAVs the risk is unacceptable.

Asking the Air Force to provide corps commanders with UAV imagery is also unsatisfactory for two reasons: First, in August 1996, the Chief of Staff of the Army directed that Predator's concept of operation be assessed. The assessment occurred during *Ulchi Focus Lens* (UFL) 1997, an Army training exercise in Korea. There were three findings: there are not enough Predators; they have cumbersome tasking and retasking procedures; and they are too dependent on dedicated communications.¹⁷ The assessment went on to add that the Army requirement for a short range UAV at Corps/Division is still valid.¹⁸ There are no indications that this situation will change in the future.

Second, recent UAV experiences in Operation Allied Force against Serbia show that the combined efforts of both Hunter and Predator were not sufficient to cover required target sets. It is unrealistic to expect the Air Force to cover corps requirements when theater targets in Kosovo overwhelmingly exceeded Predator availability. Given that by the end of the campaign NATO was launching around 300 strike sorties a day into Kosovo airspace, there was never enough real-time UAV imagery to provide dynamic targeting for anything but a handful of sorties each day.¹⁹ Had there been a ground war, this already lopsided ratio of UAV platforms versus targets could have easily quadrupled. It is also unrealistic to believe that the Air Force will procure sufficient Predator UAVs to cover its need plus that of four Army corps.

Task Force Hunter provided a look at how future conflicts will be fought. III Corps and V Corps operational concepts and the resounding mission accomplishment of Task Force Hunter illustrated the need for corps-level UAV companies.

In their combined statement to the Senate Armed Forces Committee after Operation Allied Force, General Clark, Admiral Ellis and Lieutenant General Short listed all UAV systems as integral parts of the intelligence, surveillance and reconnaissance system employed by the U.S. and NATO. They go on to say:

Another key lesson is the requirement for additional resources for low density, high demand mission areas. Of particular note are Intelligence, Surveillance and Reconnaissance (ISR). ISR resources, both equipment and personnel, are essential to every aspect of modern warfare. Areas impacted by ISR include force protection, targeting, and bomb damage assessment...We presently do not have enough of these assets to meet our needs.²⁰

These comments endorse the requirement for corps-level UAV systems and the necessity of increasing the modified table of organization equipment authorization.

The experience gained in Kosovo provides the evidence to justify change. The Army must act now to ensure future UAV equipment is capable of satisfying imagery intelligence requirements at the depth needed to shape battlefield conditions. Commanders have seen the art of the possible; they will expect nothing less. Army intelligence must aggressively pursue a replacement for Hunter and take steps to ready the force for "Tomorrow's Fight."

The compelling choice is to acquire a replacement for the Hunter UAV and populate the four Army corps with UAV companies.

RECOMMENDATIONS:

Establish an UAV company at I, III, V, and XVIII Corps. Use III and V Corps' concept of operations and lessons learned as a basis for UAV company authorizations (MTOE) in personnel and equipment for 24-hour operations. Ensure UAV performance in range, endurance, and altitude is capable of covering the TUAV and Predator gap. Equip UAVs with relay or satellite communications to overcome line of sight challenges posed by terrain. Infuse aviation expertise by assigning the company to the aerial exploitation battalion in the Corps' separate military intelligence brigade. Add joint broadcast system connectivity and long-haul communication equipment to the company's MTOE. Provision for logistical support with a low density/ high demand concept in mind; add spare parts accordingly.

WORD COUNT= 5,334

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³ Steven Kosiak and Elizabeth Heeter, "Unmanned Aerial Vehicles – Current Plans and Prospects for the Future," 11 July 1997, available from <<http://www.csbaonline.org>>; Internet; accessed 6 February 2001.

⁴ June E. O'Neill, "Options for Enhancing the Department of Defense's Unmanned Aerial Vehicle Programs," September 1998, available from <<http://www.fas.org/man/congress/1998/cbo-uav5.htm>>; Internet; accessed 23 February 2001.

⁵ Congress, House of Representatives, Committee on Military Procurement and Research and Development, statement by LTG Jay M Gardner, USA, Assistant Vice Chief of Staff of the Army, 9 April 1997, available from <http://www.fas.org/irp/congress/1997_hr/h970409g.htm>; Internet; accessed 6 February 2001.

⁶ Michael A. Fant, LTC, USA, "Task Force Hunter Highlights," briefing slides with scripted commentary, Fort Hood, 15th Military Intelligence Battalion (Aerial Exploitation), November 2000.

⁷ Colby M. Broadwater, BG, USA. "Corps Deep Strike," briefing slides with scripted commentary, Fort Hood, III Corps, 8 June 1999.

⁸ Ibid

⁹ William M. Knarr, Jr., COL, USA, "TSM Notes Update on SEMA and UAV Operations and Programs," Military Intelligence 26 (January-March 2000): 57-59.

¹⁰ Mark H. Segovis, MAJ, USA and CPT Robert M. Salvatore, USA, "Deep Operations Coordination Cell (DOCC)," Newsletter #8 Tactics, Techniques and Procedures from Task Force Hawk Deep Operations, Volume I, (Aug 00): 27.

¹¹ Ibid, 23.

¹² Marine Corps, Iraq Country Handbook, MCIA-2630-IZ-001-98 (Quantico, VA: U.S. Marine Corps Intelligence Agency, February 1998), 149-150.

¹³ Stephen B. Cook, MAJ, USA, "Task Force Hunter (UAV): Sharing Manned Airspace in the Balkans," available from <<http://call.army.mil/call/nfft/sep00/cook.htm>>; Internet; accessed 6 February 2001.

¹⁴ Leonel Nascimneto, CPT, USA, "UAV Lessons Learned from Operation ALLIED FORCE," available from <<http://call.army.mil/call/nfft/janfeb00/part1.htm>>; Internet; accessed 6 February 2001.

¹⁵ Ibid.

¹⁶ The ideas in this sentence are based on remarks made by a speaker participating in the Commandant's Lecture Series.

¹⁷ Bill Knarr, COL, USA, TSM-UAV, "Army Family of UAV's," briefing slides with scripted commentary, Fort Huachuca, U.S. Army Intelligence Center and School, 3 November 1998.

¹⁸ Ibid

¹⁹ Tim Ripley, "UAVs over Kosovo – did the Earth move?," 1 December 1999, available from <<http://defence-data.com/features/fpage34.htm>>; Internet; accessed 5 February 2001.

²⁰ Wesley Clark, GEN, USA James Ellis, Jr., ADM, USN, and Michael Short, LTGEN, USAF, "Combined Prepared Statement of the United States European Command before the Senate Armed Services Committee," 106th Congress, 1st Session, 21 October 1999, p. 5-6.

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